

CLAIMS

1. (Currently Amended) An electric power assisted steering apparatus for a vehicle having a steering wheel and road wheels, comprising:
a steering mechanism, which operatively connects [[a]] said steering wheel to [[the]] said road wheels of the vehicle;
an electric motor operatively connected to [[the]] said steering mechanism;
a torque ~~sensing means~~ sensor adapted to produce a first output signal indicative of the torque carried by a portion of [[the]] said steering mechanism;
a vehicle speed ~~sensing means~~ sensor for producing a second output signal indicative of the speed of [[the]] said vehicle;
a signal processing unit adapted to receive [[the]] said first signal and second ~~signals~~ signal and to produce a torque demand signal representative of a torque to be applied to [[the]] said steering mechanism by [[the]] said motor; and
a motor drive stage adapted to provide a drive current to [[the]] said motor responsive to [[the]] said torque demand signal,
~~in which the~~ wherein said apparatus includes torque limiting device means,
arranged to limit the magnitude of [[the]] said torque to be applied to [[the]] said steering mechanism to a maximum of a value that increases in time from a first value to a second value at a rate that is dependent on [[the]] said second signal.
2. (Currently Amended) [[The]] An electric power assisted steering apparatus of claim 1 ~~in which the~~ wherein said torque limiting device means is arranged to limit the magnitude of [[the]] said torque when [[the]] said apparatus is powered-up.
3. (Currently Amended) [[The]] An electric power assisted steering apparatus of claim 1 ~~or claim 2~~ further comprising a speed mapping device means, arranged to generate from [[the]] said vehicle speed a torque limit increase signal indicative of [[the]] a rate at which [[the]] said torque limit is to increase.

4. (Currently Amended) ~~[[The]]~~ An electric power assisted steering apparatus of claim 3 ~~in which~~ wherein said the torque limit increase rate for a first vehicle speed is higher than ~~[[the]]~~ said torque limit increase rate at a second, higher, vehicle speed.
5. (Currently Amended) ~~[[The]]~~ An electric power assisted steering apparatus of claim 3 ~~or claim 4 in which the~~ wherein said speed mapping device means determines the torque limit increase rate between ~~[[the]]~~ said first speed and second speeds by interpolation.
6. (Currently Amended) ~~[[The]]~~ An electric power assisted steering apparatus of ~~any one of claims 3 to 5 in which the~~ claim 3 wherein said speed mapping device means is arranged to generate, from ~~[[the]]~~ said torque limit increase signal, ~~[[the]]~~ said torque limit to be passed to ~~[[the]]~~ said torque limiting device means.
7. (Currently Amended) ~~[[The]]~~ An electric power assisted steering apparatus of claim 6 ~~in which the~~ wherein said speed mapping device means is arranged to calculate ~~[[the]]~~ a torque limit as increasing linearly at ~~[[the]]~~ said torque limit increase rate.
8. (Currently Amended) ~~[[The]]~~ An electric power assisted steering apparatus of claim 6 ~~in which the~~ wherein said torque limit increases non-linearly.
9. (Currently Amended) ~~[[The]]~~ An electric power assisted steering apparatus of claim 8 ~~in which~~ wherein said the rate at which ~~[[the]]~~ said torque limit increases ~~increases~~ with time.

10. (Currently Amended) ~~[[The]]~~ An electric power assisted steering apparatus of claim 8 ~~or claim 9 in which the~~ wherein said speed mapping device means includes an intermediate value generating device means and a non-linear mapping device means, where ~~[[the]]~~ said intermediate value generating device generates an intermediate value which increases linearly at ~~[[the]]~~ said torque limit increase rate and ~~[[the]]~~ said non-linear mapping device means is arranged to map ~~[[the]]~~ said intermediate value to generate ~~[[the]]~~ said torque limit using a non-linear map.

11. (Currently Amended) ~~[[The]]~~ An electric power assisted steering apparatus of claim 10 in which ~~[[the]]~~ said map is defined by at least three points defining ~~[[the]]~~ a relationship between ~~[[the]]~~ said intermediate value and ~~[[the]]~~ said torque limit at those points, and in which successive pairs of points in increasing intermediate value ~~[[may]]~~ have an increasing gradient between them.

12. (Currently Amended) The electric power assisted steering apparatus of ~~any preceding claim~~ claim 1 further comprising ~~filter means, to a filter to filter~~ the measured vehicle speed, ~~[[the]]~~ said ~~filter means~~ being a low pass filter.

13. (Currently Amended) An electric power assisted steering apparatus of ~~any preceding claim~~ claim 1 further comprising an offset device means, which take as an input the torque limit and combine the torque limit with an additive offset.

14. (Currently Amended) An electric power assisted steering apparatus of ~~any preceding claim~~ claim 1 further comprising a cap device means, which cap the torque limit to a maximum value.

15. (Currently Amended) An electric power assisted steering apparatus for a vehicle having a steering wheel and road wheels, comprising:
a steering mechanism, which operatively connects [[a]] said steering wheel to [[the]] said road wheels of [[the]] said vehicle;
an electric motor operatively connected to [[the]] said steering mechanism;
a torque sensing device means adapted to produce a first output signal indicative of [[the]] a torque carried by a portion of [[the]] said steering mechanism;
a signal processing unit adapted to receive [[the]] said first signal and to produce a torque demand signal representative of a torque to be applied to [[the]] said steering mechanism by [[the]] said motor; and
a motor drive stage adapted to provide a drive current to [[the]] said motor responsive to [[the]] said torque demand signal,
~~in which the~~ wherein said apparatus includes a torque limiting device means, arranged to limit the magnitude of [[the]] said torque to be applied to [[the]] said steering mechanism to a maximum of a value that increases from a first value to a second value at a rate that varies with time.

16. (Currently Amended) [[The]] An electric power assisted steering apparatus of claim 15 in which [[the]] said torque limiting device means is arranged to limit the magnitude of [[the]] said torque when [[the]] said apparatus is powered-up.

17. (Currently Amended) [[The]] An electric power assisted steering apparatus of claim 15 ~~or claim 16 in which~~ wherein said rate at which [[the]] said torque limit increases increases with time.

18. (Currently Amended) [[The]] An electric power assisted steering apparatus of ~~any one of claims 15 to 17~~ claim 15 in which [[the]] said torque limiting device means includes an intermediate value generating device means and a non-linear mapping device means, ~~in which the~~ wherein said intermediate value generating device means is arranged to generate an intermediate value that increases linearly at a torque limit increase rate and [[the]] said non-linear mapping device means is arranged to map [[the]] said intermediate value to generate [[the]] said torque limit

using a non-linear map.

19. (Currently Amended) [[The]] An electric power assisted steering apparatus of claim 18 ~~in which the~~ wherein said map is defined by at least three points defining [[the]] a relationship between [[the]] said intermediate value and [[the]] said torque limit at those points, in which successive pairs of points in increasing intermediate value have an increasing gradient between them.

20. (Currently Amended) [[The]] An electric power assisted steering apparatus of ~~any one of claims 15 to 19~~ claim 15 further comprising a vehicle speed sensor ~~sensing means~~ for producing a second output signal indicative of [[the]] a speed of [[the]] said vehicle, in which [[the]] said rate at which [[the]] said torque limit increases is dependent upon [[the]] said second output signal.

Claims 21-38 (Cancelled)